

In the Claims

The following listing of claims is provided in accordance with 37 CFR §1.121.

1. (Original) A method comprising:

combusting a feed stream to form combustion products; and

reforming the combustion products to produce a gaseous composition comprising hydrogen.
2. (Original) The method of Claim 1, wherein the feed stream comprises a mixture of air or oxygen and hydrocarbon, wherein a molar ratio of oxygen to hydrocarbon is about 0.05 to about 2.0.
3. (Original) The method of Claim 2, wherein the hydrocarbon is selected from a group consisting of alkanes, alkenes, alkynes, or a combination comprising at least one of the foregoing hydrocarbons.
4. (Original) The method of Claim 3, wherein the hydrocarbon is methane or natural gas.
5. (Original) The method of Claim 1, wherein a temperature of the feed stream prior to combustion is about 18 to about 800°C
6. (Original) The method of Claim 1, further comprising utilizing heat from a byproduct to preheat the feed stream prior to introduction into the cyclical compression chamber.
7. (Original) The method of Claim 1, further comprising compressing the feed stream prior to combustion.
8. (Original) The method of Claim 1, wherein combustion occurs within a cyclical compression chamber in mechanical communication with a reciprocating piston or a rotary piston.

9. (Original) The method of Claim 8, wherein the pressure within the cyclical compression chamber has a volumetric compression ratio of greater than or equal to about 3:1.

10. (Original) The method of Claim 1, wherein the reforming occurs within a reforming section, and wherein the reforming section is downstream of and in fluid communication with the cyclical compression chamber.

11. (Original) The method of Claim 10, wherein pre-heated steam or a pre-heated mixture of steam and hydrocarbon is introduced into the reforming section prior to reforming.

12. (Original) The method of Claim 10, wherein the reforming section contains a catalyst.

13. (Original) The method of Claim 11, wherein the catalyst is a metal, an oxide of a transition metal, an oxide of an alkali earth metal, an oxide of a main group element or a combination comprising at least one of the foregoing catalysts.

14. (Original) The method of Claim 1, further comprising separating hydrogen from the gaseous composition comprising hydrogen.

15. (Original) A method for producing hydrogen comprising:

introducing a feed stream comprising natural gas and air or oxygen into a cyclical compression chamber;

compressing the feed stream in the cyclical compression chamber;

combusting the feed stream in the cyclical compression chamber to produce combustion products;

discharging the combustion products from the cyclical compression chamber into a reforming section; and

reforming the combustion products with steam in the reforming section to produce a gaseous composition comprising hydrogen.

16. (Original) The method of Claim 15, wherein the feed stream comprises a mixture of air or oxygen and methane, wherein a molar ratio of oxygen to methane is about 0.10 to about 0.50.

17. (Original) The method of Claim 15, wherein a temperature of the feed stream prior to combustion is about 18 to about 800°C.

18. (Original) The method of Claim 15, wherein the compression is conducted at a volumetric compression ratio of greater than or equal to about 3:1.

19. (Original) The method of Claim 15, wherein the ratio of added steam to carbon content in the hydrocarbons in the combustion products in the reforming section is about 1 to about 4.

20. (Original) The method of Claim 15, further comprising separating hydrogen from the gaseous composition.

21. (Original) The method of Claim 15, wherein the reforming section contains a catalyst.

22. (Original) The method of Claim 21, wherein the catalyst is a metal, an oxide of a transition metal, an oxide of an alkali earth metal, an oxide of a main group element or a combination comprising at least one of the foregoing catalysts.

23. (Original) A device employing the method of Claim 1.

Serial No. 10/823,954
Reply to March 21, 2008 Office Action

136439-1

24 – 35 (Cancelled).